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GUIDELINES FOR THE CONTROL OF VACCINE-PREVENTABLE DISEASES

1993

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

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MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Bureau of Communicable Disease Control

INVESTIGATION OF VACCINE-PREVENTABLE DISEASES

1. Report case to appropriate health authorities:

   - Providers report to the local board of health in the town in which they practice.
   - Local boards of health report to their regional epidemiologist. In addition, providers may contact their regional epidemiologist.
   - Regional epidemiologists report to the state Department of Public Health.

2. Verify diagnosis:

   - Obtain description of illness from patient, family member of patient and health care provider.
   - Does it meet the case definition?
   - For measles, mumps and rubella, encourage serology submission. For pertussis, encourage laboratory confirmation (Culture/DFA, serology). Specimens should be submitted to the State Laboratory Institute, 305 South Street Jamaica Plain, MA 02130.

3. Obtain the case's immunization history from the health care provider. (Minimal acceptable documentation: Month/year administered.)

4. Identify possible sources of exposure

   - Are there other contacts with similar symptoms in the family, day care, school, work setting, social group?
   - Was there travel to other areas one incubation period prior to onset of symptoms?
   - Did the case have visitors from other areas one incubation period prior to onset of symptoms?

5. Prevent spread

   - Inform BOH's, MD's, medical settings, schools, day cares
   - Isolate case during infectious period
   - Identify everyone who was in contact with case during infectious period
   - Think about "zones of exposure," consider the following groups

     - household members
     - school/day care
     - medical facility where the patient was seen
     - work place of case (especially day cares, schools and medical settings)
     - religious/social groups
     - sports teams, other-extra curricular groups
     - bus mates
     - close friends

   - Identify susceptibles (will differ for each disease), paying attention to high-risk individuals
   - Isolate susceptibles for the required period (The Isolation and Quarantine Regulations apply to students/health care workers only)
   - Immunize/prophylax when appropriate
   - Maintain surveillance of contacts for two incubation periods

Please refer to your regional epidemiologist for assistance in implementation of these guidelines. The towns they cover and their telephone numbers are on the following pages.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
EPIDEMIOLOGISTS - CITIES AND TOWNS

CENTRAL DISTRICT - John Bicknell, Margaret Regele, RN
180 Beaman Street, W. Boylston 01583
508-792-7880 FAX 508-792-7706

WESTERN REGION - Marija Popstefanija, Judith Coates, RN
Communicable Diseases, Western MA Public Health Center
Room N424 UMass, Amherst, MA 01003
413-545-6600 FAX 413-545-2608

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METROPOLITAN REGION - Lisa Berger
305 South Street, Jamaica Plain 02130
617-522-3700, X432/7-2686 FAX 617-522-8735

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NORTHEASTERN REGION - Karen Ogden, Bertha Hopper, RN
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Tewksbury 01876
508-851-7261,7-7908 FAX 508-640-1027

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SOUTHEASTERN REGION - Joan Thompson-Allen, Antoinette Borges, RN
Immunization Program, 109 Rhode Island Road (Rte 79)
Lakeville, MA 02347, **508-947-1231, X591** FAX 617-727-9296

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Whitman
Yarmouth

CITY OF BOSTON - Nancy Harrington
Boston Immunization Program
1010 Massachusetts Avenue, 2nd Floor
Boston 02118
617-534-5609 **FAX 617-534-5358**

HEAD OFFICE
Massachusetts Immunization Program
305 South Street
Jamaica Plain, MA 02130

Massachusetts Department of Public Heath
Bureau of Communicable Disease Control

Summary Information on Vaccine Preventable Diseases

Disease	Incubation Period	Infectious Period	Minimum Period of Isolation of Patient	Minimum Period of Isolation/Exclusion of Susceptible Contacts
Measles	7-14 days (Range) 8-12 days (Usual)	4 days before rash to 4 days after	4 days from onset of rash; health care workers/hosp. patients are isolated 7 days from rash onset	5-18 days after exposure (except for health care workers: 5-21 days)
Mumps	12-25 days (Range) 16-18 days (Usual)	6 days before swelling of glands to 9 days after	9 days from onset of gland swelling	12-26 days after exposure
Rubella	14-21 days (Range) 16-18 days (Usual)	7 days before rash to 7 days after	7 days from onset of rash	7-21 days after exposure
Pertussis	7-21 days (Range) 10-14 days (Usual)	Not on antibiotics: 2 wks. before coughing to 3 wks. after cough onset On antibiotics: infectious until they have completed 5 days of the 10-14 days of antibiotic treatment	Not on antibiotics: 3 wks. from onset of cough On antibiotics: until they have completed 5 days of appropriate antibiotic therapy	Depends on if the contact is asymptomatic/symptomatic and on antibiotics or not; it can be as short as 0 days if the asymptomatic contact starts on antibiotics or as long as 21 days if antibiotics are not taken or individual is at high-risk. Please refer to pertussis section for specific guidelines.
Haemophilus influenzae b (Hib)	variable 2-4 days	As long as organism is in upper respiratory tract. Non-communicable within 24-48 hours after beginning chemoprophylaxis.	For 24 hours after initiation of chemoprophylaxis	Until after initiation of chemoprophylaxis

Note: For additional disease-specific information, please refer to the attached guidelines

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MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Bureau of Communicable Disease Control

MEASLES CONTROL

INFECTIOUS AGENT: Measles virus is classified as a *Morbillivirus* in the paramyxovirus family

MODE OF TRANSMISSION:

- airborne
- droplet spread
- direct contact with nasopharyngeal secretions of infected person

INCUBATION PERIOD: 7-14 days (Range)
8-12 days (Usual)

INFECTIOUS PERIOD: 4 days prior to rash onset to 4 days after rash onset
Measles is highly infectious with 5,000 infectious particles excreted per hour. Viral particles may remain suspended in air for up to 90 minutes.

CLINICAL CASE DEFINITION:

- a generalized rash lasting ≥3 days
- a temperature ≥38.3° C (101° F)
- cough, coryza, or conjunctivitis
- serologic confirmation (IgM or 4-fold rise in IgG). For more information, see section on "Laboratory Confirmation."

Complications: otitis media, pneumonia, diarrhea and encephalitis (approx. 1/1000 cases)

Note: Remember that the case definition applies to the classic presentation of measles only. Measles has various non-classical presentations.

CONTROL MEASURES:

1. Implement control measures before serologic confirmation.

2. Isolate case during infectious period as defined above.

3. In order to identify those exposed, think in terms of the "zones of exposure described in the table "Investigation of Vaccine Preventable Diseases." Measles is so contagious that we often consider an entire institution exposed.

4. Identify high-risk susceptibles that case had contact with during the infectious period.

    - Pregnant women should be referred to their obstetrician for screening and counseling.

    - Immunocompromised individuals should be referred to their physician. (See "Definitions" section for examples of immunocompromised individuals.)

5. Identify susceptibles. These are individuals without proof of immunity. Proof of immunity is defined as follows:

    - born before January 1, 1957 **OR**

    - two doses of measles vaccine with both doses administered at ≥12 months of age, given at least one month apart **OR**

    - serologic proof of immunity

    Note: physician-diagnosed disease is <u>no longer accepted</u>

6. Immunize all susceptibles ≥12 months of age for whom it is not contraindicated, keeping in mind the following:

    - **MEASLES VACCINE GIVEN WITHIN 72 HOURS OF EXPOSURE CAN PREVENT DISEASE.** The combined measles, mumps, rubella (MMR) vaccine is preferred to provide additional protection against mumps and rubella.

    - Unvaccinated individuals who have received immune globulin (IG) within 3 months prior to their exposure should also be vaccinated immediately. Since IG interferes with immune response, they should be revaccinated with MMR 12 weeks later.

- Vaccinating an individual who may be incubating measles is not harmful.

- Even if it is beyond 72 hours of exposure, giving measles vaccine is encouraged. The situation should be viewed as an opportunity to vaccinate.

7. For susceptibles with contraindications to measles vaccine, give IG 0.25cc/kg (maximum 15cc). IG may help to modify or prevent illness, but is unlikely to be effective if given more than 6 days postexposure. IG should be given to:

   - pregnant women
   - immunocompromised individuals
   - infants < 12 months of age*
   - those with anaphylactic reactions to eggs, neomycin or other contraindications for measles vaccine.

   Although IG modifies illness, individuals can still become infectious and must be isolated as discussed below.

   Remember that susceptible individuals > 12 months of age, who receive IG and do not have a contraindication to MMR, should receive MMR 12 weeks later.

* Monovalent measles vaccine is not routinely given to infants < 12 months and MMR should never be given.

HIV-INFECTED INDIVIDUALS:

The occurrence of severe measles in symptomatic HIV-infected children and the lack of reported serious or unusual reactions to MMR vaccine have led both the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Pediatrics (AAP) to recommend routine MMR immunization for HIV-infected children regardless of symptoms.

MANAGEMENT OF EXPOSED HIV-INFECTED INDIVIDUALS

Regardless of immunization status, if exposed, IG should be given as follows:

1. Asymptomatic HIV-infected individuals should receive 0.25cc/kg (maximum 15cc)

2. Symptomatic HIV-infected individuals should receive 0.5cc/kg (maximum 15cc)

3. Children who have received intravenous IG within 2 weeks of exposure do not require additional passive immunization. Unimmunized children, who are >12 months of age, should be immunized with MMR 12 weeks later.

Similar guidelines should be considered for management of HIV-infected adults.

8. Isolation:

- Isolate susceptibles on days 5-18 postexposure.
- Susceptibles include those who received IG or were immunized >72 hours postexposure.

9. Exclusion:

- If there was a discrete, (one time) exposure, exclude on days 5-18 from that exposure.
- If exposure was continuous, exclude on days 5-18 from the day of rash onset in index case.
- In certain settings, e.g., school/health care settings, 2 doses of measles vaccine would be required in order not to be excluded.
- If there is more than one case of measles, susceptibles will need to be excluded until 14 days after the onset of rash in the last reported case in the outbreak setting.

See Attachment 1 for an example of a general measles control letter.

10. In a school setting:

- Determine if there are any:
  - Pregnant teachers, staff and students (do not forget about student teachers) throughout the school.
  - Immunocompromised individuals anywhere in the school.
  - Medical/religious exemptions anywhere in the school and particularly in the classroom of the suspect case. These individuals need to be excluded and referred as discussed earlier.

- Susceptible classroom contacts who have already received one dose of MMR and receive a second dose of measles vaccine within 72 hours of exposure can be readily readmitted; otherwise they should be excluded as discussed above. This also applies to susceptible contacts exposed via extracurricular activities with the case.

- If multiple cases occur, these guidelines may change to include other classrooms and their teachers.

See attachments 2 and 3 for further information on measles control in a school/college setting.

11. Recommendations for health care facilities are more rigorous. All staff born after 1956 should have proof of two doses of measles vaccine or serologic proof of immunity. Medical personnel born before 1957 have acquired measles in medical facilities. Therefore, consideration should be given to requiring at least one dose of measles vaccine for staff born after 1951 and before 1957. Susceptible staff should be excluded 5-21 days after the first day of exposure to the case's earliest day of potential infectiousness e.g., 5 days before rash onset. Personnel who become sick should be relieved from work for 7 days after they develop a rash. See attachment 4 for further information on measles control in health care settings.

12. Surveillance:
    Should continue for 2 incubation periods (28 days) after the last case's date of rash onset.

LABORATORY CONFIRMATION:
(Please send all specimens to the State Laboratory Institute for analysis.)

1. Measles IgM titer - must be drawn on day ≥ 3 of rash in order for results to be reliable **OR**

2. A four-fold rise in IgG titers between acute and convalescent specimens.

   - The acute specimen should be drawn <4 days after onset on rash, held and submitted with convalescent specimen.

   - The convalescent specimen should be drawn 10-14 days after the acute specimen was taken.

3. DFA smear and viral isolation in tissue culture. (Not licensed; available at Childrens' Hospital Medical Center in Boston.)

References:

1. Advisory Committee on Immunization Practices (ACIP). Recommendations for measles prevention. MMWR 1989; 38(S-9):1-13.

2. Atkinson WL, Markowitz LE, Adams NC. Transmission of measles in medical settings - United States, 1985-1989. Am J Med 1991; 91 (suppl 38):3214-3235.

3. Gurevich I, Barzaga RA, Cunha BA. Measles: lessons from an outbreak. AJIC 1992; December: 319-325.

4. Measles. In Peter G, ed. 1991 Red Book: report of the Committee on Infectious Diseases, 22nd ed. Elk Grove Village, IL; American Academy of Pediatrics, 1991: 308-322.

5. Lett S. "Measles and nosocomial measles control" presented at the APIC 17th Annual Education Conference, Washington DC, June 1990.

6. Poland GA, Nichol KL. Medical students as sources of rubella and measles outbreaks. Arch Int Med 1990; 150:44-46.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Bureau of Communicable Disease Control

MUMPS CONTROL

INFECTIOUS AGENT: Mumps virus, a member of the genus Paramyxovirus

MODE OF TRANSMISSION:

- droplet spread
- direct contact with nasopharyngeal secretions of an infected person

INCUBATION PERIOD: 12-25 days (Range)
16-18 days (Usual)

INFECTIOUS PERIOD: 6 days before onset of parotitis (swelling of glands) to 9 days after; maximum infectiousness occurs about 48 hours before onset of illness.

CLINICAL CASE DEFINITION:

- Acute onset of unilateral or bilateral tenderness, self-limited swelling of the parotid or salivary gland lasting 2 or more days without other apparent cause.

- Serologic confirmation (4-fold rise in IgG). IgM serology is available at some labs, but is not licensed yet. For more information see section on "Serologic Confirmation." Serum amylase is nonspecific and is not acceptable for diagnostic purposes.

Clinical diagnosis is unreliable, making serologic confirmation necessary.

Other important clinical features may include:

- Fever, myalgia, anorexia, malaise and headache
- Approximately one third of the cases do not cause clinically apparent salivary gland swelling

COMPLICATIONS: meningitis (15%), encephalitis (0.5%), orchitis (common after puberty, but sterility rarely occurs); other rare complications include arthritis, renal involvement, thyroiditis, mastitis, and hearing impairment.

CONTROL MEASURES:

1. Implement control measures before serologic confirmation.

2. Isolate case during infectious period as defined above.

3. In order to identify those exposed, think in terms of the "zones of exposure" described earlier in the table "Investigation of vaccine-Preventable Diseases."

4. Identify high-risk susceptibles that case had contact with during the infectious period.

    - Pregnant women should be referred to their obstetrician for screening/counseling.

    - Immunocompromised individuals should be referred to their physicians. (See "Definitions" section for examples of immunocompromised individuals.)

5. Identify susceptibles. These are individuals without proof of immunity. Proof of immunity is defined as follows:

    - Born before January 1, 1957. People born before 1957 are considered to be immune. However, these recommendations do not preclude vaccination of possibly susceptible persons born before 1957, who may be exposed in outbreak settings **OR**

    - documentation of mumps vaccination on or after the first birthday **OR**

    - serologic proof of immunity

    Note: Physician-diagnosed disease is no longer accepted.

6. Immunize all susceptibles for whom it is not contraindicated, keeping in mind the following:

    - Mumps/mumps containing vaccines, unlike measles vaccines, will not prevent acquisition of disease after infection. However, susceptible contacts $\geq$12 months of age should be vaccinated.

    - Vaccinating an individual who may be incubating mumps is not harmful.

    - Immune globulin (IG) is not of value in postexposure prophylaxis and is not recommended.

7. Isolation:

    - If only one case has been reported, isolate all susceptibles on days 12-26 postexposure.

8. Exclusion:

    - If there was a discrete (one time) exposure, exclude on days 12-26 from that exposure.

    - If a discrete exposure cannot be identified, exclude on days 12-26 after onset of parotid swelling in the index case.

    - If there is more than one case of mumps, susceptibles will need to be excluded until 26 days after the onset of parotitis in the last reported case in the outbreak setting.

9. In a school setting, evaluate the classroom of the suspect case.

    - Determine if there are any:

        - Pregnant teachers, staff and students (do not forget about student teachers)

        - Immunocompromised individuals

        - Medical/religious exemptions in the classroom or other "high contact" areas such as lunchroom and bus of the suspect case

        - Susceptible classroom contacts

      These individuals need to be excluded and referred as described above.

    - If there is only one case, excluded susceptibles can be readmitted immediately after vaccination

    - If multiple cases occur anywhere in the school, all susceptibles, including those recently vaccinated, need to be excluded for 26 days after the last onset of parotitis. In addition, these guidelines may change to include other classrooms and their teachers.

10. In both school/medical settings, take this opportunity to make sure teachers and staff born after 1956 are appropriately vaccinated or have serologic evidence of immunity. Encourage those who are not, to get vaccinated.

11. Surveillance:

    Should continue for 2 incubation periods (52 days) after the last case's date of onset.

LABORATORY CONFIRMATION:

Serology:

1. A four-fold rise in IgG titers between acute and convalescent specimens.

    - The acute specimen should be drawn <4 days after onset of swelling, held and submitted with the convalescent specimen

    - The convalescent specimen should be drawn 10-14 days after the acute specimen was taken

    (Please send all IgG serologies to the State Laboratory Institute for analysis)

2. Some commercial laboratories offer a mumps IgM serology. Consult with individual labs to determine when is the best time to draw the specimens. The State Laboratory does not offer IgM serology.

PRINCIPAL CONTROL STRATEGY: Achieve and maintain high immunization levels through:

1. Routine childhood immunization.

2. Vaccination of adolescents and adults, females and males.

CONCERNS ABOUT GIVING MUMPS VACCINE TO WOMEN OF CHILDBEARING AGE:

1. There is no evidence that live mumps vaccine will cause mumps in an unborn fetus. Although live mumps virus vaccine can cross the placenta, the virus has not been isolated from fetal tissues of susceptible females who received vaccine.

2. Women should be informed of the theoretical risk to the fetus if they are pregnant or become pregnant within 3 months of being immunized. They should be warned not to become pregnant for 3 months following the vaccination.

3. Documentation, in the individual's chart, of this counseling and advice as well as their last menstrual period (LMP) and method of birth control is recommended.

References:

1. Advisory Committee on Immunization Practices (ACIP). Recommendations on mumps prevention. MMWR 1989; 38:388-400.

2. Hersh BS, Fire PE, Kent WK, et al. Mumps outbreak in a highly vaccinated population. J Ped 1991; 119:187-193.

3. Mumps. In Peter G, ed. 1991 Red Book: Report of the Committee on Infectious Diseases. 22nd ed. Elk Grove Village, IL; American Academy of Pediatrics, 1991: 328-332.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
Division of Communicable Disease Control

RUBELLA CONTROL

INFECTIOUS AGENT: Rubella virus is classified as a rubivirus in the Togavirus family.

MODE OF TRANSMISSION:

- droplet spread
- direct contact with nasopharyngeal secretions of infected persons

INCUBATION PERIOD: 14-21 days (range)
16-18 days (usual)

INFECTIOUS PERIOD: 7 days prior to rash onset to 7 days after rash onset

CLINICAL CASE DEFINITION:

- Acute onset of generalized maculopapular rash
- Temperature >37.2° C (>99° F), if measured
- Arthralgia/arthritis, or lymphadenopathy, or conjunctivitis
- Serologic confirmation (IgM or 4-fold rise in IgG). For more information see, section on "Laboratory Confirmation."

Clinical diagnosis is unreliable, making serologic confirmation necessary.

Other important clinical features may include:

- Prodrome of 1-5 days, with a low-grade fever, headache, malaise, mild coryza and conjunctivitis
- 50% of infections are subclinical and many are unrecognized

Complications: The disease itself is relatively benign in most individuals. However, if susceptible pregnant women are exposed, the risk of the fetus having congenital anomalies is great.

CONTROL MEASURES:

1. Implement control measure before serologic confirmation. This is especially important in settings involving pregnant women (obstetric-gynecologic and prenatal clinics).

2. Isolate case during infectious period as defined above.

3. In order to identify those exposed, think in terms of the "zones of exposure" described earlier in the table "Investigation of Vaccine-Preventable Diseases."

4. Identify high-risk susceptibles that case had contact with during the infectious period

   - Pregnant women should be referred to their obstetrician for screening/counseling immediately

   - Immunocompromised individuals should be referred to their physicians. (See "Definitions" section for examples of immunocompromised individuals.)

5. Identify susceptibles. These are individuals without proof of immunity. Proof of immunity is defined as follows:

   - documentation of rubella vaccination on or after the first birthday

   - serologic proof of immunity

   Note: **Physician-diagnosed disease and born before 1957 is not acceptable proof of immunity.**

6. Immunize all susceptibles for whom it is not contraindicated, keeping in mind the following:

   - Rubella containing vaccines will not prevent acquisition of disease after infection.

   - Vaccinating an individual who may be incubating rubella is not harmful.

   - The routine use of immune globulin (IG) for postexposure prophylaxis of rubella in early pregnancy is not recommended. Administration of IG should be considered only if termination of

the pregnancy is not an option. Although limited data suggest that IG may prevent or modify infection in an exposed, susceptible person, it does **NOT** guarantee that fetal infection has been prevented.

7. Isolation:

   - Isolate all susceptibles on days 7-21 postexposure.
   - Susceptibles include those immunized with vaccine immediately postexposure.

8. Exclusion:

   - If there was a discrete (one time) exposure, exclude on days 7-21 from that exposure.
   - If a discrete exposure cannot be identified, exclude on days 7-21 after date of rash onset in the index case.
   - If there is more than one case of rubella, susceptibles will need to be excluded until 3 weeks after the onset of rash in the last reported case in the outbreak setting.

9. In a school setting:

   - Determine if there are any:
     - Pregnant teachers, staff and students (do not forget about student teachers) anywhere in the school
     - Immunocompromised individuals
     - Medical/religious exemptions anywhere in the school and particularly in the classroom of the suspect case

     These individuals should be excluded and referred as described above.

   - If there is only one case, excluded susceptibles can be readmitted immediately after vaccination
   - If multiple cases occur, then all susceptibles, including those recently vaccinated, need to be excluded for 21 days after the last case's rash onset. These guidelines may change to include other classrooms and their teachers.

10. In an outbreak in a medical setting, mandatory exclusion and vaccination of adults is important because pregnant woman may be exposed.

11. Surveillance:
Should continue for 2 incubation periods (42 days) after the last case's date of rash onset.

Laboratory Confirmation:

Serology:
(Please send all specimens to the State Laboratory Institute for analysis.)

1. Rubella IgM titer - best drawn on day ≥ 3 of rash **OR**

2. A four-fold rise in IgG between acute and convalescent specimens.

   - The acute specimen should be drawn < 4 days after rash onset, held, and submitted with the convalescent specimen.

   - The convalescent specimen should be drawn 10-14 days after the acute specimen was taken.

PRINCIPAL CONTROL STRATEGY:
Achieve and maintain high immunization levels through:

1. Routine childhood immunization.

2. Vaccination of adolescents and adults, females and males. Due to the large number of outbreaks and an increase in congenital rubella syndrome (CRS), those who have not been immunized or do not have proof of immunization (written or serologic) should receive rubella vaccine.

CONCERNS ABOUT REACTIONS TO THE RUBELLA VACCINE:

1. Vaccinees can develop low-grade fever, rash and lymphadenopathy 5-12 days following vaccination.

2. Arthralgia (joint pain) and transient arthritis (joint inflammation) occur only in those who are susceptible. **These side effects have not been reported in those who have received the vaccine before, or who have had the disease.** Approximately 25% of post-pubertal females vaccinated with rubella vaccine may develop arthralgia and 10% develop transient arthritis-like symptoms.

3. If joint symptoms or pain occur, they are transient and they:

    - generally begin 1-3 weeks after vaccination
    - persist for 1 day-3 weeks
    - rarely recur
    - usually do not cause disruption of work activities

4. Occurrence of chronic joint symptoms is rare and is usually higher following natural infection than following vaccination.

5. Transient pains in the arms and legs have also been reported but are very rare.

CONCERNS ABOUT GIVING RUBELLA VACCINE TO WOMEN OF CHILDBEARING AGE:

1. There is no evidence that rubella vaccination causes CRS.

2. Women should be informed of the theoretical risk to the fetus if they are pregnant or become pregnant within 3 months of being immunized. They should be warned not to become pregnant for 3 months following vaccination.

3. Documentation, in the individual's chart of this counseling and advice as well as their last menstrual period (LMP) and method of birth control, is recommended.

References:

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MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Bureau of Communicable Disease Control

PERTUSSIS CONTROL

INFECTIOUS AGENT: *Bordetella pertussis*

MODE OF TRANSMISSION: Contact with discharges from respiratory mucous membranes of infected persons via

- droplet spread
- direct contact

INCUBATION PERIOD: 7-21 days (Range)
10-14 days (Usual)

INFECTIOUS PERIOD:

- Not on antibiotics: infectious 2 weeks before cough onset to 3 weeks after cough onset
- On antibiotics: infectious until 5 of the 10-14 days of recommended antibiotic treatment have been completed. Antibiotics shorten the period of infectivity.

CLINICAL CASE DEFINITION:

1. A cough illness lasting ≥ 14 days with ≥ 1 of the following:

   - paroxysms of cough
   - inspiratory "whoop"
   - post-tussive vomiting

in an individual that is also laboratory confirmed (culture, serology), **OR** epidemiologically linked to a laboratory confirmed case.

2. In outbreak settings (≥ 2 cases), a case may be defined as:

   - a cough illness (no additional symptoms) lasting ≥ 14 days, **OR**
   - a cough illness lasting ≥ 14 days with ≥ 1 of the following:
     - paroxysms of cough

- inspiratory "whoop"
- post-tussive vomiting

CLINICAL PRESENTATION

Pertussis is characterized by 3 stages. These stages are important when determining the type of laboratory test needed to confirm *B. pertussis*.

	Stages	Average Duration
1. Catarrhal	upper respiratory infection with a cough which becomes increasingly persistent (fever is usually absent)	2 weeks
2. Paroxysmal	paroxysmal, spasmodic cough with or without post-tussive vomiting. Vomiting is often absent in infants, teenagers and adults. Sometimes at the termination of the paroxysm, a long drawn inspiratory effort will be accompanied by a whoop. The whoop is often absent in infants less than 6 months of age (especially <3 months of age), teenagers and adults.	2 weeks
3. Convalescent	symptoms gradually resolve	2 weeks (Range: 6-8 weeks)

REMEMBER: In adolescents and adults, pertussis often presents like chronic bronchitis.

DIAGNOSIS:

Information on diagnostic testing can be found in attachment 5.

TREATMENT AND PROPHYLAXIS:

The recommendations for treatment and prophylaxis are the same. If treatment is begun early, then symptoms of pertussis may be modified. If treatment is begun later in the course of illness, it may not decrease symptoms. However, it will decrease the period of infectiousness.

PERTUSSIS TREATMENT AND PROPHYLAXIS		
DRUG	**CHILD**	**ADULT**
Erythromycin (drug of choice)	40 mg/kg/day PO divided into 4 doses/day for 10-4 days (maximum of 2 gms/day)	250 mg PO 4 times/day for 10-14 days
Trimethoprim/ Sulfamethoxazole (alternative)	8 mg TMP/40 mg SMX/kg/day PO divided into 2 doses/day for 10-14 days	160 mg TMP/800 MG SMX PO 2 times/day for 10-14 days

CONTROL MEASURES:

1. Control measures are usually implemented after initial laboratory confirmation, but do not have to be limited to confirmation for each subsequent case.

2. Isolate the case during the infectious period as defined above.

3. Make sure case and household contacts have been placed on the appropriate antibiotics.

4. Identify other contacts that had significant exposure to the case during the infectious period as defined above.

    - As a "rule of thumb," exposure is usually defined as contact with a case for 20 or more hours per week
    - Less exposure will be <u>significant</u> if those exposed are at high-risk, for example:

        - infants
        - unimmunized young children
        - immunocompromised individuals
        - pregnant women
        - individuals with chronic respiratory illness, including asthmatics.

        (If you are unsure about the severity of the child's illness, consult with the health care provider to determine if they feel severity of respiratory illness places the child at increased risk.)

5. Upon notification of a pertussis case in your school/day care, begin surveillance of contacts. Think about "zones of exposures." Consider the

following groups:

- Households contacts
- Day care contacts
- School contacts
- Bus contacts
- Boyfriends/girlfriends, particularly the core group of friends the case spends large amounts of time with
- Sports teams (within school and outside of school)
- Extracurricular activities (band, chorus, acting, church, etc.)
- Babysitting
- Special study groups
- Internships at a school/medical setting

6. Household contacts:

   - Is there a family day care at the house?
   - Are there symptomatic household contacts that work in day care/school/medical settings?

7. Day care settings:

   - How much time does the child spend in the day care?
   - Does the child have a particular play group?
   - What are the ages and immunization histories of the other children?
   - Are there other symptomatic children?

8. School settings:

   - Initiate surveillance by considering the exposed groups outlined above.

   - Teachers who have a case in their classes should refer other coughing children to the nurse's office for evaluation.

   - If the case is on any sports teams or other extracurricular school groups, screen the other members for coughing. (This is an important mode of spread in Middle School/High School.)

   - Notify other staff and ask them to refer students who are coughing for more than a week to the nurse's office.

   - Determine if there are any teachers/staff that have been coughing.

- Symptomatic students, teachers and staff will be referred for medical evaluation as outlined in Section 10.

9. Questions to ask coughing students referred to your office for evaluation. (In day care settings, it will be necessary to ask these questions of the parents of coughing children who are in the same group as the case.)

    - Do you have cold symptoms (runny nose, sneezing) and when did they start?

    - Do you have a cough and when did it start?

    - Describe your cough:

        - Do you feel like you are choking and cannot breath?
        - Do you cough at night or is coughing worse at night?
        - Do you have coughing spells where you feel like you cannot stop coughing?
        - Do you vomit after coughing?

    - Are there other people in the house with a cough?

    Attachment 6, the "Pertussis Surveillance Log Sheet", will assist you in developing a line listing of students with cough illness of 7-13 days, as well as those with longer coughs or coughs with associated symptoms which meet the clinical case definition for pertussis (Attachment 5) in outbreak situations. Attachment 7, the "Pertussis Surveillance Summary Sheet", will assist you in calculating attack rates and determining a cough profile for your school/institution.

10. Referral and letters for the health care provider:

    - If individuals have symptoms, give them (in a day care, give the parent) a copy of the parent letter for suspect cases (Attachment 8) and the health care provider letter for suspect cases (Attachment 9) along with a pertussis fact sheet. Have them bring the "provider letter" to their medical provider for evaluation and treatment if indicated.

    - If individuals are asymptomatic, but have had enough contact with a case to require prophylaxis, then give them a copy of the parent letter for contacts (Attachment 10) and the provider letter for contacts (Attachment 11) along with a pertussis fact sheet. Have them bring the "provider letter" to their health care provider for evaluation and prophylaxis.

11. General Letters to Parents and Staff:

- When there is one case in a class or two or more cases in a school, "information and control" letters are mailed to all staff and parents (Attachments 12 and 13) along with a pertussis fact sheet. School nurses should continue to provide the appropriate letters to suspected cases and contacts referred to the office for possible pertussis, as defined in Step 10.

- In a day care, if there are a number of children coughing in the case's class/play group, an "information and control" letter should be developed which stresses the increased risk of pertussis in infants and young children; and it should be distributed to the parents.

12. Religious/Medical Exemptions: This is a concern for lower grades only. In the middle, junior and high school setting, both vaccinated/unvaccinated students are believed to be at the same risk for infection due to waning immunity after the last dose of DTP vaccine. In lower grades and day cares, if multiple cases occur, it may be necessary to exclude unimmunized individuals.

13. Prophylaxis: Asymptomatic/symptomatic contacts as defined above are candidates for prophylaxis. **They should receive antibiotics regardless of history of immunization, disease or laboratory test result.** Prophylaxis can be effective if started within 21 days from last exposure to the infectious person. The earlier antibiotics are started, the more effective they are at preventing disease transmission.

    A. In elementary school/day care settings since the children spend most, if not all, of their time together as a group, prophylaxis will be as follows:

        1. If there is one case and minimal interaction with others, you would prophylax those seated near the case or the case's play group. In some situations, consideration can be given to prophylaxis of the entire class/group.

        2. If there was more than one case and a number of coughing students, you would prophylax the entire class.

B. In middle, junior and high school settings, focus on the groups mentioned under #5. Try to determine if there are any patterns of interaction that would increase exposure time among a group. Do the students "travel" through the day as a core group? If no, are there any groups that have most of their classes together. If you can identify such clusters, prophylaxis of groups with significant contact of ≥ 20 hours per week may prevent further spread. If there is more than one case on a sports team, it will be necessary to prophylax the entire sports team. This would also apply to other extracurricular groups as well. Application of this recommendation varies according to the extent of exposure.

C. In very rare situations, pertussis may spread school-wide. Disruption of school activities may occur when: a) there is a large number of laboratory confirmed cases; b) surveillance reveals > 20 % of students with cough illness meeting the case definition of pertussis; and c) absentee rates are very high. Under these circumstances, consideration may be given to more wide-scale prophylaxis, after consultation with MDPH officials and school officials.

D. It is extremely important to remember to prophylax asymptomatic contacts. This is because of the potential for silent transmission of pertussis. It is also important to make sure that the antibiotics are taken for the prescribed period of time. Cases and contacts who do not complete the 10-14 day course will need to repeat it again.

14. Isolation/Exclusion:

Who do you exclude from school/work/medical settings?

A. Cases:

1. If it is < 21 days since cough onset, cases should be excluded until they have completed 5 days of the 10-14 day course of antibiotic treatment. If it is > 21 days since cough onset, they are no longer infectious and no antibiotics/exclusion is required.

2. Cases who refuse to take antibiotics are excluded for 21 days after cough onset.

B. Contacts:

1. Asymptomatic contacts:

   a. Who refuse antibiotics must be excluded for 21 days after last day on exposure to the infectious person.

   b. If placed on antibiotics, do not need to be excluded.

2. Symptomatic contacts:

   a. Should be referred to their physician for testing and/or prophylaxis.

   b. Should be placed on antibiotics and may return to school/work after 5 days of the 10-14 day course of antibiotic treatment have been completed.

   c. If the physician defers antibiotics until the diagnostic test results are available, the suspect individual should be excluded from school. If results are negative, they may return immediately. If results are positive, antibiotics are taken as defined above, with the person being excluded for first 5 days of the 10-14 day course of treatment.

3. In addition to antibiotic prophylaxis, contacts that are < 7 years of age, who are unimmunized or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization according to the following guidelines as soon as possible after exposure:

   a. Children, who have received their 3rd dose of DTP ≥ 6 months before exposure, should receive a fourth dose at this time.

   b. Children, who have received 4 doses of DTP, should get a booster dose of DTP unless a dose has been given within the last 3 years.

15. Surveillance:

    Should continue for 2 incubation periods (42 days) after the last case's cough onset.

Laboratory confirmation:
Please refer to Attachment 5.

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of Pediatrics, 1991: 358-369.

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MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
BUREAU OF COMMUNICABLE DISEASE CONTROL

INVASIVE *HAEMOPHILUS INFLUENZAE* TYPE b (Hib) CONTROL

INFECTIOUS AGENT:

H. influenzae organisms are small, gram negative coccobacilli, with six antigenically distinct capsular types (types a to f). Invasive disease in infants and children is almost always caused by type b.

MODE OF TRANSMISSION:

- Person to person through direct contact.
- Droplet inhalation.

INCUBATION PERIOD:

Unknown and widely variable, probably short, 2-4 days.

INFECTIOUS PERIOD:

Unknown, maybe as long as the organism is present in the upper respiratory tract.

Noncommunicable within 24 hours after starting effective antibiotic therapy.

CLINICAL CASE DEFINITION:

Positive culture from a normally sterile site.

CLINICAL MANIFESTATIONS IN INFANTS AND YOUNG CHILDREN:

COMMON MANIFESTATIONS: meningitis, epiglottitis, bacteremia, septic arthritis, cellulitis, pneumonia, empyema, otitis media, sinusitis, endocarditis, occasionally neonatal meningitis and sepsis.

OTHER MANIFESTATIONS: purulent pericarditis, conjunctivitis, osteomyelitis, peritonitis, epididymo-orchitis, glossitis, uvulitis, septic thrombophlebitis, and possibly chronic bronchitis in adults with chronic lung disease.

RISK GROUPS:

- Children 3 months to 3 years, particularly if they have had a previous documented episode of invasive Hib disease.

  Other risk groups include: Native Americans, Blacks, males, urban dwellers; and those with sickle cell disease, asplenia, immunodeficiency syndrome, and malignancies.

CONTROL MEASURES:

1. Identify significant contacts as outlined below.

2. Observe contacts closely for febrile illness, usually occurring within 7 days.

3. Isolation:
   Respiratory isolation of the case for 24 hours after initiation of rifampin.

4. Exclusion:
   Susceptible contacts must be excluded until prophylaxis begins (for details, refer to day care control below).

5. Prophylaxis:
   Rifampin prophylaxis is recommended to eliminate carriage of this organism and decrease the secondary attack rate in certain groups of close contacts. It is usually recommended in the week following the onset in the index case. It is during this time period that most secondary cases occur. Please refer to the table below for the dosage and schedule of rifampin.

   IF PROPHYLAXIS IS INDICATED, IT SHOULD BE GIVEN REGARDLESS OF THE IMMUNIZATION STATUS OF THE INDIVIDUAL AND SHOULD INCLUDE THE ENTIRE COHORT (CHILDREN AND ADULTS).

Prophylaxis Schedule for Hib:

Group	Dosage/Schedule
Adult:	**600 mg PO QD x 4 days**
Children:	**20 mg/kg PO QD x 4 days (maximum-600 mg/dose)**
Infant: (< 1 month of age)	**10 mg/kg PO QD x 4 days**

If it is more than seven days since the onset of the index case, rifampin prophylaxis is usually not recommended, since the period of greatest risk has already passed. Exceptions: more than two cases or extreme concern of those exposed.

1. Household Control Measures:

A household contact is defined as:

a. An individual residing with the index case or a non-resident who had ≥ 24 hours of contact with the index case in the seven days preceding their onset.

b. Anyone who shared eating, or drinking utensils or other exchange of saliva (kissing or teething objects) with the index case during the seven days preceding their onset.

- **All household contacts, irrespective of age, in those households with at least one contact < 48 months of age should receive rifampin, regardless of the age of the contact or immunization status of those children.**

- No prophylaxis is needed for contacts in households where all contacts are ≥ 48 months of age.

2. Day Care Control Measures:

A. Prophylaxis:
Rifampin should be given, regardless of immunization history in the following situations:

a) If only one case has occurred but exposure is ≥ 24 hrs/wk in the day care center and there are contacts < 24 months of age, the entire group, regardless of age or immunization status, and including staff, should be prophylaxed.

No prophylaxis is required if there is only one case and all contacts are ≥ 48 months of age.

b) If two or more cases of invasive disease have occurred within 60 days, all attendees and staff regardless of age and immunization status should be prophylaxed.

B. Exclusion/ Admission:

a) Children and staff should be excluded from the center until rifampin has been started.

b) Children entering the center during the time prophylaxis is given should also receive rifampin.

c) The index case should also receive rifampin on discharge from the hospital to assure elimination of the organism.

6. Surveillance:
   Surveillance should be done for 2 incubation periods (2-3 weeks)

7. **LABORATORY CONFIRMATION:**
   Laboratory confirmation is obtained when *Haemophilus influenzae* type b is cultured from a normally sterile site, e.g., blood CSF, joint, pleural fluid, etc.

   NOTE:
   If invasive Hib disease occurs in a child < 25 months of age, it may not provide immunity and that child should be subsequently immunized according to the age-appropriate schedule.

References:

1. Advisory Committee on Immunization Practices: Update on adult immunizations. MMWR 1991; 40 (RR-12):40-41, 59.

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DEFINITIONS

(Technical meaning of terms used in the text)

1. **Carrier** - A person or animal that harbors a specific infectious agent in the absence of discernible clinical disease and serves as a potential source of infection. The carrier state may exist in an individual with an infection that is inapparent throughout its course (commonly known as healthy or asymptomatic carrier), or during the incubation period, convalescence, and postconvalescence of an individual with a clinically recognizable disease (commonly known as incubatory carrier or convalescent carrier). Under either circumstance, the carrier state may be of short or long duration (temporary or transient carrier, or chronic carrier).

2. **Chemoprophylaxis** - The administration of a chemical, including antibiotics, to prevent the development of an infection or the progression of an infection to active manifest disease. **Chemotherapy**, on the other hand, refers to use of a chemical to cure a clinically recognizable disease or to limit its further progress.

3. **Communicable disease** - An illness due to a specific infectious agent or its toxic products which arises through transmission of that agent or its products from an infected person, animal, or inanimate reservoir to a susceptible host, either directly or indirectly through an intermediate plant or animal host, vector, or the inanimate environment (see also Transmission of Infectious Agents).

4. **Communicable period** - The time or times during which an infectious agent may be transferred directly or indirectly from an infected person to another person, from an infected animal to man, or from an infected person to an animal, including arthropods.

5. **Contact** - A person or animal that has been in an association with an infected person or animal or a contaminated environment that might provide an opportunity to acquire the infective agent.

6. **Herd immunity** - The immunity of a group or community. The resistance of a group to invasion and spread of an infectious agent, based on the resistance to infection of a high proportion of individual members of the group. Resistance/protection is acquired after natural disease or immunization.

7. **Immune individual** - A person or animal that has specific protective antibodies or cellular immunity as a result of previous infection or immunization or is so conditioned by such previous specific experience as to respond adequately to prevent infection and/or clinical illness following exposure to a specific infectious agent. Immunity is relative: an ordinarily effective protection may be overwhelmed by an excessive dose of the infectious agent or by exposure through an unusual portal of entry; it may also be impaired by immunosuppressive drug therapy, concurrent disease, or the aging process. (See Resistance.)

8. **Immunocompromised/Immunosuppressed** - An individual whose immune system is not functioning optimally and is therefore at increased risk for contracting communicable diseases and experiencing complications. An individual can be immunocompromised due to an underlying disease or immunosuppressive drugs.

   Examples of conditions associated with immunosuppression include but are not limited to: splenic dysfunction or anatomic asplenia, congenital immunodeficiencies, acquired immunodeficiencies e.g., HIV infection, any malignancy (Hodgkin's disease, lymphoma, leukemia and multiple myeloma pose highest risk), renal failure/nephrotic syndrome, chronic liver disease, diabetes mellitus, prematurity, pregnancy, organ transplantation or anyone taking immunosuppressive drugs.

   Immunosuppressive drugs - Examples include, but are not limited to: anti-malignancy/chemotherapeutic agents, radiation therapy, corticosteroids. **PLEASE NOTE: Individuals are considered immunosuppressed until three months AFTER cessation of their immunosuppressive therapy.**

   Corticosteroids
   Patients on corticosteroids can become immunocompromised. Patients treated with corticosteroids should be categorized as follows:

   1. **Previously healthy children who are on a short-term (less than 2 weeks), low to moderate, daily maintenance dose of systemic corticosteroids, or on a low or moderate dose, long-term, alternate-day treatment with short-acting systemic corticosteroids for a condition which, in itself, is not associated with a compromised immune system.** These patients, who are receiving only maintenance physiologic doses of corticosteroids and who have no underlying immune defects, can receive live virus vaccines. Also, the administration of topical corticosteroids, either on the skin or in the respiratory system or eyes, and intra-articular, bursal, or tendon injections of steroids usually does not result in immunosuppression that would contraindicate live virus vaccines. However, live virus vaccines should be avoided if systemic immunosuppression results from prolonged topical application.

   2. **Healthy children treated with large amounts of systemic corticosteroids.** The exact amount of systemic corticosteroids needed to suppress the immune response in an otherwise healthy child, and the duration of their administration, are not known at this time. However, children in this category should not be given live virus vaccines.

   3. **Children with a disease which, in itself, is considered to suppress the immune response and who are being treated with either systemic or locally administered corticosteroids.** These children are at risk and should not be given live virus vaccine, except under special circumstances.

9. **Inapparent infection** - The presence of infection in a host without recognizable clinical signs or symptoms. Inapparent infections are identifiable only by laboratory means or by the development of positive reactivity to specific skin tests. Synonyms: Asymptomatic, subclinical, occult infection.

10. **Incubation period** - The time interval between initial contact with an infectious agent and the appearance of the first sign or symptom of the disease in question, or, in a vector, of the first time transmission is possible (extrinsic incubation period).

11. **Infected individual** - A person or animal that harbors an infectious agent and who has either manifest disease or inapparent infection (see Carrier). An infectious person or animal is one from whom the infectious agent can be naturally acquired.

12. **Infection** - The entry and development or multiplication of an infectious agent in the body of man or animals. Infection is not synonymous with infectious. disease; the result may be inapparent (see Inapparent infection) or manifest. The presence of living infectious agents on exterior surfaces of the body, or upon articles of apparel or soiled articles, is not infection, but represent contamination of such surfaces and articles.

13. **Infectious agent** - An organism (virus, rickettsia, bacteria, fungus, protozoa or helminth) that is capable of producing infection or infectious disease.

14. **Isolation** - As applied to patients, isolation represents separation, for the period of communicability, of infected persons or animals from others in such places and under such conditions as to prevent or limit the direct or indirect transmission of the infectious agent from those infected to those who are susceptible or who may spread the agent to others. In contrast, quarantine applies to restrictions on the health contacts of an infectious case.

15. **Nosocomial infection** - An infection occurring in a patient in a hospital or other health care facility and in whom it was not present or incubating at the time of admission, or the residual of an infection acquired during a previous admission. Includes infections acquired in the hospital but appearing after discharge, and also such infections among the staff of the facility.

16. **Quarantine** - Restriction of the activities of well persons or animals who have been exposed to a case of communicable disease during its period of communicability (i.e., contacts) to prevent disease transmission during the incubation period if infection should occur.

17. **Serologic confirmation** - A blood test that measures antibodies to a specific organism. It can confirm acute disease or previous disease connoting immunity (see immune individual).

Attachment 1
(measles letter)

Dear :

There has been a suspect case of measles reported at your _____. Measles is the most infectious human disease. It is spread through the air when an infected individual coughs, sneezes or talks. Measles first symptoms include a cough, runny nose and red, watery eyes. A few days later, a blotchy rash appears: often first on the face and then spreads to the rest of the body. Please refer to the enclosed "Public Health Fact Sheet" for more information about the symptoms, transmission and prevention of measles.

If measles vaccine is given within 72 hours of exposure, it can prevent a susceptible individual from contracting measles. Measles vaccine should be given in combination with mumps and rubella vaccines as MMR vaccine to provide additional protection.

In order to prevent spread, we are recommending the following control measures:

1. High risk individuals such as pregnant women and immunocompromised individuals should be promptly identified and referred to their health care providers.

2. Proof of immunity to measles is defined as:

   - born before January 1, 1957 **OR**
   - 2 doses of measles vaccine, with both doses administered at $\geq$12 months of age, given at least 1 month apart **OR**
   - serologic proof of immunity.

   NOTE: Physician-diagnosed disease is <u>no longer acceptable</u>.

3. All those without proof of immunity who are $\geq$12 months of age and for whom it is not contraindicated, should be immunized. Keep in mind the following:

   - Unvaccinated individuals who have received immune globulin (IG) within 3 months prior to their exposure should also be vaccinated immediately. Since IG interferes with immune response, they should be revaccinated 12 weeks later.

   - Vaccinating an individual who may be incubating measles is <u>not</u> harmful.

- Even if it is beyond 72 hours of exposure, giving measles vaccine is encouraged. The situation should be viewed as an opportunity to vaccinate.

4. For susceptibles with contraindications to measles vaccine, give IG 0.25cc/kg (maximum 15cc). IG may help to modify or prevent illness, but is unlikely to be effective if given more than 6 days postexposure. IG should be given to:

   - pregnant women
   - immunocompromised individuals
   - infants <12 months of age
   - those with anaphylactic reactions to eggs, neomycin or other contraindications for measles vaccine.

   Although IG modifies illness, individuals can still become infectious and must be isolated as discussed below.

5. All susceptibles, including those who received their first or second doses of MMR greater than 72 hours after exposure and those who received immune globulin, **MUST BE EXCLUDED FROM TO .**

If you have any questions, please contact
of at .

Sincerely,

Recommendations for Measles Control in College Settings

The following additional recommendations are important for measles control in college settings.

1. Isolate the case at the infirmary or send home. Dormitories are not adequate for isolation. When students are sent home, remember to evaluate the immune status of household contacts.

2. Evaluate zones of exposure with priority given to the dormitory, classes, extracurricular activities, and cafeteria of the cases during their infectious period. Do not forget about contact with staff, teachers and high-risk individuals as defined previously. Also consider contacts in internship settings, like schools or hospitals.

3. Identify and exclude susceptibles as outlined earlier. Acceptable proof of immunity to measles consists of:

    - Born before January 1, 1957, **OR**
    - Two doses of measles vaccine with both doses administered at $\geq$12 months of age, given at least one month apart, **OR**
    - Serologic proof of immunity.

    Note: Physician-diagnosed disease is <u>no longer accepted</u>.

4. Vaccination should be offered to all susceptibles unless contraindicated. Susceptibles include those who received IG, those with one dose of MMR, or those with no doses due to medical/religious exemptions. Those who are susceptible and have not received a second dose of measles vaccine within 72 hours of their first exposure should be appropriately excluded from school/campus.

5. In outbreak situations, susceptibles as defined above, should be excluded from school, work, or other activities as defined earlier.

6. Be sure to notify other schools exposed through sports or other extracurricular events.

Control Guidelines for Sports Teams and Extracurricular Groups

Control guidelines **DIFFER** and are dependent on whether or not measles is currently occurring at your institution. Schools without cases occurring, but who will be involved with an institution that is experiencing cases, also need to follow control guidelines. Please refer to the appropriate category below for the recommendations for your facility.

A. At the School Where Measles Cases are Reported:

1. All students, staff, and media personnel leaving to attend activities at other schools or participating in sports or other group activities at your school must have proof of immunity as defined below:

   - Born before January 1, 1957 **OR**
   - Two doses of measles vaccine with both doses administered at ≥12 months of age, given at least one month apart (the second dose must have been given before the rash onset of the first case, or within 72 hours of exposure to the known case) **OR**
   - Serologic proof of immunity

   Note: Physician-diagnosed disease in <u>no longer accepted.</u>

   If the second dose of measles-containing vaccine is given 72 hours after the onset of the first case, the student must wait 18 days before participating in sporting events or traveling to another school. If multiple cases occur, the student must wait until 14 days after the onset of rash in the last reported case in the outbreak setting.

2. Please notify the schools to which students are traveling and inform them of:

   - the cases or suspected cases at your school
   - the immune status of your students and staff who will be traveling to the other school

B. **Schools Without Measles Cases Receiving Students From or Traveling to a School With Measles Cases:**

1. All students, staff and media personnel, participating in activities with students from a school with cases, must have proof of immunity as defined below.

   - Born before January 1, 1957, **OR**
   - Two doses of measles vaccine with both doses administered at ≥ 12 months of age, given at least one month apart (as outlined above), **OR**
   - Serologic proof of immunity

   Note: **Physician-diagnosed disease is <u>no longer accepted.</u>**

C. **For Both Schools:**

1. The above-described restrictions on activity should remain in place for 28 days (two incubation periods) after the last reported case.

2. Surveillance for measles should also continue for 28 days after the last case is reported or 28 days from the date of last exposure.

Measles Control in Medical Settings

In addition to control measures outlined in the Measles Control Recommendations, the following steps should be taken to enhance the prevention of nosocomial measles transmission:

1. Assess all rash illnesses.

2. Screen patients with potential airborne disease, either prior to or immediately on arrival.

3. Escort patients to a separate waiting area.

4. Masks for patients/staff.

5. If admitted: maintain on respiratory isolation for 7 days post-rash onset.

6. If not admitted: maintain respiratory isolation when patient is exiting the facility e.g., mask, separate entrance. Patient should remain in isolation at home for 4 days after rash onset.

7. Avoid placing susceptibles in a room which has been occupied by a suspect case for 2 hours following their exit.

8. Identify all contacts among patients and staff (this includes those in the waiting and examination rooms up to 2 hours after index case was present).

9. Identify susceptibles and offer:

    - MMR within 72 hours of exposure (will most likely prevent illness if given in this window); **OR**

    - IG within 6 days of exposure (may modify illness, but a person can still become infectious).

10. Notify Infection Control, Department Heads and the physicians of exposed patients. Put up "Measles Poster." (This may be obtained from your regional epidemiologist.)

11. Susceptible staff, who have not received a second dose of measles vaccine within 72 hours postexposure, must be excluded 5-21 days postexposure. Staff who contract measles should be excluded for 7 days after their first day of rash onset. In special high-risk health care settings such as transplant, oncology, neonatal units etc., exclusion criteria should be even more rigorous. Infectious control personnel may wish to exclude all susceptible personnel even if they have been immunized within 72 hours. As with all recommendations, this is dependent on resources and staff available. (Please refer to the Measles Control Recommendations for exposure and exclusion criteria.)

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
BUREAU OF COMMUNICABLE DISEASE CONTROL
LABORATORY CONFIRMATION OF PERTUSSIS

THE EXPERIENCE AT THE MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH (MDPH)

I. DIAGNOSTIC DILEMMA

No single laboratory test is useful throughout the clinical course, but are stage specific (please refer to chart below).

Test	Stage		
	Catarrhal	Cough (wk. 1-2)	Cough (wk. 3)
Culture	+	+	-
Serology	-	+/-	+

Note: The rapid diagnostic test Direct Fluorescent Antibody (DFA) has been temporarily discontinued at the State Laboratory Institute due to the unavailability of satisfactory commercial agents.

Sensitivity and Specificity of Laboratory Specimens

Test	Sensitivity	Specificity
Culture [1]	26%	85%
DFA Smear [1]	30%	33%
Serology [2]	63%	99%

[1] Halperin. J Clin Micro 1989; April: 752-757

[2] MDPH unpublished data. Please note: due to timing of serologic assay, sensitivity may range from 59-76%.

Culture and DFA are insensitive in cases presenting:

1. classically, atypically, if the patient is immunized or has received antibiotics;
2. when disease is suspected late in the course of illness;
3. when trying to identify subclinical illness and "silent transmission" in families (**Long-JID 1990**; 161:480-486) and institutions (Fisher. **J. Ped. 1989**; 114:934-939)

Serologic interpretation is influenced by a number of factors:

1. Timing of specimens is important:
   a) < 14 days from cough onset - may be too early to detect antibody rise

   b) > 56 days from cough onset - may be too late to detect antibody rise

2. Antibodies can be induced by:
   a) immunization, or
   b) infection

3. To correctly interpret results* you need to know the patient's:
   a) age
   b) immunization history
   c) clinical history
   * Please refer to Attachment A

II. DEVELOPMENT OF THE SEROLOGIC ASSAY IN MASSACHUSETTS

1. The test was originally developed in order to measure immunologic response to MDPH manufactured pertussis vaccine.
2. It was adapted for use as a diagnostic tool.
3. Standards were determined from serosurveys of the following groups:

   Those Without Illness:
   a) Infants and young children pre and post immunization
   b) Children admitted for surgery at Children's Hospital Medical Center in Boston
   c) Adults

   Those With Illness:
   a) Culture confirmed
   b) DFA confirmed
   c) Met case definition*
   * Retrospective review in progress

III. METHODOLOGY

1. ELISA: IgG to pertussis toxin (PTx, LPF)
2. Standardized by Zollinger method to yield mcg/ml of anti-Ptx. Convertible to U/ml of US Standard Human Pertussis Serum Lot 3.
3. All sera tested in 4-fold dilutions from 1/40-1/10240.

Methodologic Issues:

a) IgM and IgA antibodies to Ptx - were initially measured, but discontinued as they were less consistently elevated with disease and cross-reacted with other antigens.

b) Antibodies to Filamentous Hemagglutinin (FHA) - were initially measured but discontinued because the FHA antigen is found on all Bordetella species and is not specific to Bordetella pertussis.

IV. Use of Serology for Diagnosis

1. The parameters which appear on our MDPH Pertussis Serology Result Form (Attachment A) were derived from the sample described above in Section II.
2. Most investigators agree the sensitivity is difficult to determine due to lack of reliability of culture as the "gold standard."
3. Interpretation is influenced by the factors outlined in Section I.

V. Current Guidelines for Diagnostic Testing

Since no single laboratory test is useful in all stages of the disease and the culture media has a short (2 months) shelf life, we have developed the following guideline.

TIMING OF LABORATORY SPECIMENS

Duration of Cough	Type of Specimen
1. ≤14 days	Culture and serum* (all included in diagnosis kit, see Attachments 5B, 5C, 5D)
2. >14 days	Serum ** for serology only, (0.5cc or more)

* Although a tube to do serology is included in the kit, do not do serology if patient has been coughing for less than 14 days.

** Serum may be sent in a red top tube if specimen collection kits are unavailable.

The Massachusetts State Laboratory Institute provides two types of pertussis collection kits, one for culture/serology and one for serology only. Pediatric blood collection tubes are supplied in both kits; vacutainers (red top tubes) which can be used for older patients are not. Samples of the forms and directions on how to collect specimens are included in Attachments 5B, 5C, 5D. Test kits are available to physicians and hospital laboratories upon request by calling (617) 522-3700 X243.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
STATE LABORATORY INSTITUTE
DIAGNOSTIC MICROBIOLOGY DEPARTMENT
305 SOUTH STREET, BOSTON, MA 02130/(617)522-3700, x114
HARVEY GEORGE, Ph.D. LABORATORY DIRECTOR

Date:2-16-93 PERTUSSIS ELISA SEROLOGY

Provider: _____ Patient: _____

Address: _____

_____

Number of specimens received: __ONE____

Date specimen collected:_____ Specimen no.:_____ Results: _____

Date specimen collected: _____ Specimen no.:_____ Results: _____

Results correspond to micrograms per milliliter of IgG antibody to Bordetella pertussis toxin

INTERPRETATION OF PERTUSSIS SEROLOGY RESULTS

A. ADULTS AND ADOLESCENTS 11 YEARS OF AGE OR OLDER

REACTIVE: RESULTS GREATER THAN 20 ug/ml CONSISTENT WITH THE PRESENCE OF, OR A RECENT INFECTION WITH Bordetella pertussis

NONREACTIVE: RESULTS LESS THAN 20 ug/ml

NOTE:
THE RESULTS MAY BE MOST READILY INTERPRETED WHEN THE BLOOD IS DRAWN >14 DAYS AND <56 DAYS FROM THE ONSET OF SYMPTOMS.

B. UNIMMUNIZED INFANTS AND CHILDREN

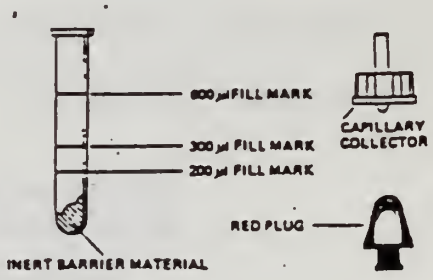
REACTIVE: FOUR FOLD RISE OR FALL IN TITER BETWEEN ACUTE AND CONVALESCENT SERA

NONREACTIVE: LESS THAN FOUR FOLD RISE IN TITER BETWEEN ACUTE AND CONVALESCENT SERA

NOTE:
1. *THE RESULTS MAY BE MOST READILY INTERPRETED WHEN THE BLOOD IS DRAWN >14 DAYS AND <56 DAYS FROM THE ONSET OF SYMPTOMS.*
2. *ACUTE AND CONVALESCENT SERA ARE RECOMMENDED ON INFANTS.*
3. *THE RESULTS ARE DIAGNOSTIC ONLY IN UNIMMUNIZED INFANTS AND CHILDREN UP TO 10 YEARS AND 11 MONTHS OF AGE*
4. *THE RESULTS ARE UNINTERPRETABLE IN IMMUNIZED INFANTS AND CHILDREN BETWEEN THE AGES OF 6 WEEKS AND 10 YEARS, 11 MONTHS.*

4/92

B. BLOOD SPECIMEN



Finger prick:

1. Collect blood in microtainer tube provided in kit.
2. Fill to 600 µl mark.
3. Discard capillary collector and insert red plug.
4. Allow blood to clot at least 30 minutes.
5. Please, centrifuge at 9000-15,000 g for at least 90 seconds, if microcentrifuge is available.

C. SHIPPING AND STORAGE

1. Ship by SAME DAY COURIER to: BACTERIOLOGY LABORATORY, ROOM 460
   STATE LABORATORY INSTITUTE
   MASSACHUSETTS CENTER FOR DISEASE CONTROL
   305 SOUTH ST.
   JAMAICA PLAIN, MA 02130
   TEL: 617-522-3700 EXT.120

2. If specimens are collected late in day or on weekend, REFRIGERATE KIT at 4°C until the morning of the next working day. DO NOT STORE AT ROOM TEMPERATURE.

PERTUSSIS DIAGNOSIS FORM
MASSACHUSETTS CENTER for DISEASE CONTROL

PLEASE PRINT CLEARLY

PATIENT IDENTIFICATION:

NAME: _____ TEL: (___) ___-____

ADDRESS: _____

CITY: _____ ZIP: _____

SEX: ____M ____F DATE OF BIRTH: ____/____/____ (mo / day / year)

REQUESTING PHYSICIAN/HEALTH CENTER: (to whom results should be communicated)

NAME: _____ TELEPHONE: (___) ___-____

HOSPITAL/HEALTH CENTER: _____

ADDRESS: _____ CITY: _____ ZIP: _____

SPECIMEN TYPE:

[__] Acute - send kit with culture, slide for fluorescent antibody & serum

[__] Convalescent (more than 4 wks of symptoms) - send serum only

DATE SPECIMEN OBTAINED: ____/____/____ (mo / day / year) KIT NO_____

FACILITY WHERE SPECIMEN OBTAINED (if different from physician/health center): _____

ADDRESS: _____ CITY: _____ ZIP: _____

SHOULD RESULTS ALSO BE SENT TO FACILITY WHERE SPECIMEN WAS OBTAINED? YES____ NO____

CLINICAL INFORMATION:

SYMPTOMS: Total duration _____ days. CIRCLE CORRECT ANSWER[S] COMMENTS:

Coryza (runny nose):	yes	no	unk	
Cough:	yes	no	unk	If yes, duration: _____ days
Coughing spells (paroxysms):	yes	no	unk	
Vomiting (typically after coughing spell):	yes	no	unk	
Whoop:	yes	no	unk	
Other:				

EPIDEMIOLOGY:

Previous DTP doses:	0, 1, 2, 3, 4, 5		unk
Exposure to confirmed or suspected pertussis case:	yes	no	unk
Treatment with antibiotics before culture obtained:	yes	no	unk

if yes: erythro/ amox/ amp/ TMP-sulfa/ other (specify): _____

date started: ____/____/____ (mo / day / year)

COMPLICATIONS:

Apnea (prolonged breathlessness; excluding cyanosis after coughing paroxysm.):	yes	no	unk
Chest X-ray positive for pneumonia:	yes	no	not done
Hospitalized:	yes	no	unk
Seizures:	yes	no	unk
Encephalopathy (neurologic or mental function impairment):	yes	no	unk
Death:	yes	no	unk
Other:			

(Do not write below this line)

Kit arrived: ____/____/____ (mo / day / year) Time: _____ [__] Processed immediately [__] Incubated overnight

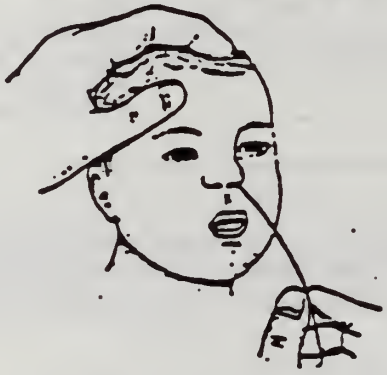
RESULTS:

INSTRUCTIONS FOR OBTAINING SPECIMENS

A. NASOPHARYNGEAL SWAB FOR CULTURE

1. Bend swab into gentle curve.

2. Insert swab into anterior nares.



3. Gently swab posterior nasopharynx: optimally cough should be induced.

4. Moisten swab in broth

5. Inoculate surface of agar slant with swab

b. Bend swab and insert completely inside tube; screw on cap tightly; (sterility is not required)

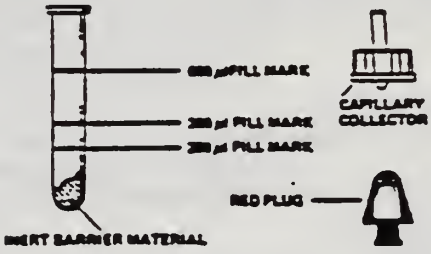
Transport Broth

Charcoal Agar Slant

B. BLOOD SPECIMEN

Venipuncture:
1. Collect 2 to 10 cc in red top tube
2. Allow blood to clot at least 30 minutes
3. Please separate serum, if centrifuge is available.

Finger prick:
1. Collect blood in microtainer tube provided in kit.
2. Fill to 600 µl mark.
3. Discard capillary collector and insert red plug.
4. Allow blood to clot at least 30 minutes.
5. Please, centrifuge at 9000-15,000 g for at least 90 seconds, if microcentrifuge is available.



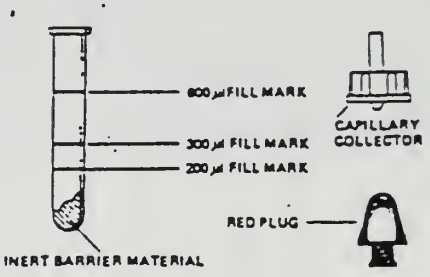
C. SHIPPING AND STORAGE

1. Ship by SAME DAY COURIER to: BACTERIOLOGY LABORATORY, ROOM 460
STATE LABORATORY INSTITUTE
MASSACHUSETTS CENTER FOR DISEASE CONTROL
305 SOUTH ST.
JAMAICA PLAIN, MA 02130
TEL: 617-522-3700 EXT.120

The use of cold packs during shipping maximizes survival of Bordetella pertussis.

2. If specimens are collected late in day or on weekend, REFRIGERATE KIT at 4°C until the morning of the next working day. DO NOT STORE AT ROOM TEMPERATURE.

B. BLOOD SPECIMEN



Finger prick:
1. Collect blood in microtainer tube provided in kit.
2. Fill to 600 µl mark.
3. Discard capillary collector and insert red plug.
4. Allow blood to clot at least 30 minutes.
5. Please, centrifuge at 9000-15,000 g for at least 90 seconds, if microcentrifuge is available.

C. SHIPPING AND STORAGE

1. Ship by SAME DAY COURIER to: BACTERIOLOGY LABORATORY, ROOM 460
STATE LABORATORY INSTITUTE
MASSACHUSETTS CENTER FOR DISEASE CONTROL
305 SOUTH ST.
JAMAICA PLAIN, MA 02130
TEL: 617-522-3700 EXT.120

2. If specimens are collected late in day or on weekend, REFRIGERATE KIT at 4°C until the morning of the next working day. DO NOT STORE AT ROOM TEMPERATURE.

PERTUSSIS SURVEILLANCE
LOG SHEET

INSTITUTION_____

DATE _____

					CHARACTERIZE COUGH (CHECK ONLY ONE)		
NAME	GRADE	HOME ROOM	HOW MANY DAYS HAVE YOU BEEN COUGHING?	HAVE YOU BEEN COUGHING IN SPASAMS AND UNABLE TO CATCH YOUR BREATH, OR HAD VOMITING AFTER COUGHING?	COUGHING ALONE FOR ONLY 7-13 DAYS	COUGHING ALONE FOR $\geq$ 14 DAYS	COUGHING FOR $\geq$ 14 DAYS WITH $\geq$ 1 OF THE FOLLOWING: SPASMODIC COUGH, "WHOOP", OR COUGH WITH VOMITING

N:WORKSHT (1/93)

Attachment o

PERTUSSIS SURVEILLANCE
SUMMARY SHEET

SCHOOL_____

DATE _____

CATEGORY	TOTAL NUMBER	COUGH ALONE FOR 7-13 DAYS	ATTACK RATE	COUGH ALONE FOR ≥ 14 DAYS	COUGH FOR ≥ 14 DAYS WITH ≥ 1 0F THE FOLLOWING: SPASMODIC COUGH, "WHOOP", OR COUGH WITH VOMITING	ATTACK RATE
TOTALS						

n:worksht (1/93)

Attachment 7

Attachment 8
Suspect case
Pertussis
Parent letter

Dear Parent/Guardian:

There is a confirmed case of pertussis in your child's class. Your child has been identified as having symptoms suggestive of pertussis (whooping cough). In addition, other students at the school have been identified with cough illness and may also be cases of pertussis.

Pertussis is a highly communicable disease that is spread through the air when infected people cough. The characteristic symptoms, a long series of coughs followed by a whooping noise, are more common in very young children. Older persons are more likely to have an upper respiratory illness that begins with cold symptoms and an irritating cough, which becomes increasingly severe over 1-2 weeks. There is generally no fever. Please refer to the enclosed "Public Health Fact Sheet" for information about the symptoms, transmission and treatment of pertussis. Antibiotic therapy early in the course of the disease may decrease the severity of symptoms and reduce the infectiousness of the ill person. **Antibiotics are also recommended for contacts of pertussis cases in order to prevent them from contracting and/or transmitting the disease.**

The following recommendations are being made to help prevent further spread of pertussis at your child's school:

1. Your child is symptomatic (cold, persistent cough, etc.). Please have your child evaluated by your health care provider for pertussis and begin treatment.

2. All newly identified cases (including suspect cases) will be excluded from school until they have completed 5 of the 10-14 days required for adequate antibiotic therapy.

3. All household contacts of diagnosed cases should receive antibiotics to prevent additional infections. In addition to antibiotic prophylaxis, contacts who are less than 7 years of age, who are unimmunized or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization, according to the following guidelines, as soon as possible after exposure:

    a. Children who have received their third dose of DTP six months or more before exposure should receive a fourth dose at this time.

b. Children who have received four doses of DTP should get a booster dose of DTP, unless a dose has been given within the last three years.

4. Contacts who are asymptomatic (do not have any symptoms) may return to work/school immediately after beginning erythromycin prophylaxis.

Please take the enclosed letter with you to your health care provider. If you wish further information, please call of at .

Sincerely,

Attachment 9
Suspect case
Pertussis
(Provider letter)

Dear Health Care Provider:

Your patient has been identified as having symptoms suggestive of pertussis and is being referred to you for an evaluation. Students with documented pertussis and other's with cough-like illness have been identified at your patient's school. We feel significant symptoms compatible with pertussis are a cough ≥ 14 days or paroxysmal cough, or cough post-tussive vomiting ≥ 7 days. However, in light of the extent of this outbreak, even milder symptoms should be regarded as suspicious.

The following guidelines are being recommended for symptomatic students to help contain this outbreak:

1. Unless a specific medical contraindication exists, place symptomatic student and all household contacts on erythromycin (50mg/kg/day divided into 4 doses/day, maximum dose 2 gms/day for 10-14 days). Trimethoprim/sulfamethoxazole is an acceptable alternative for those unable to tolerate erythromycin. (Pediatric dose: 8 mg Tmp/40 mg SMX/kg/day divided into 2 doses/day for 10-14 days. Adult dose: 160 mg Tmp/800 mg SMX given 2 times/day for 10-14 days.)

2. Obtain appropriate laboratory confirmation as indicated by duration of symptoms.

    a. For those with a cough of ≤ 14 days in duration, obtain a nasopharyngeal culture for *Bordetella pertussis*. Culture kits are available from the State Laboratory (617) 522-3700, X243.
    b. When cough is >14 days in duration, cultures are often negative and serologic confirmation is most useful. For those with a cough > 14 days, obtain serum (0.5 cc or more). If a specimen kit is not available, please send it in a red top tube (serum-separator type preferred) with the appropriate forms to the State Laboratory Institute, 305 South Street, Jamaica Plain, MA 02130, Attention: Pertussis Serology Lab.

3. Symptomatic students must refrain from public activities, and will be excluded from school, until 5 days of antibiotic therapy have been completed. If student or household contacts are not symptomatic, they do not need to restrict their public activities. Asymptomatic students may return to school immediately.

4. **Due to the great potential for silent transmission in families,** we recommend all household contacts of diagnosed cases receive erythromycin or, if not tolerated, trimethoprim/sulfamethoxazole prophylaxis. All symptomatic contacts should be evaluated, placed on antibiotic therapy and excluded from activities as outlined above for cases. Any contacts who are not symptomatic still need to receive preventive antibiotic therapy, but do not need to restrict their public activities.

5. In addition to antibiotic prophylaxis, contacts that are < 7 years of age, who are unimmunized, or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization, according to the following guidelines, as soon as possible after exposure:

    a. Children who have received their third dose of DTP $\geq$ 6 months before exposure should receive a fourth dose at this time.

    b. Children who have received 4 doses of DTP should get a booster dose of DTP, unless a dose has been given within the last 3 years.

If you have any questions, please do not hesitate to contact
of at .

Sincerely,

Attachment 10
Contact student
Pertussis
(Parent Letter)

Dear Parent/Guardian:

There is a confirmed case(s) of pertussis (whooping cough) in your child's school. Your child has had significant contact with the case(s). If order to prevent your child from acquiring pertussis, he/she will need to take preventive antibiotic treatment.

Pertussis is a highly communicable disease that is spread through the air when infected people cough. The characteristic symptoms, a long series of coughs followed by a whooping noise, are more common in very young children. Older persons are more likely to have an upper respiratory illness that begins with cold symptoms and an irritating cough, which becomes increasingly severe over 1-2 weeks. There is generally no fever. Please refer to the enclosed "Public Health Fact Sheet" for information about the symptoms, transmission and treatment of pertussis. Antibiotic therapy early in the course of the disease may decrease the severity of symptoms and reduce the infectiousness of the ill person. **Antibiotics are also recommended for contacts of pertussis cases in order to prevent them from contracting and/or transmitting the** disease.

Also enclosed is a letter to take to your health care provider so your child can begin preventative treatment as soon as possible. In order to prevent further spread of pertussis in the school, your child must be on this treatment or will be excluded from school.

Since pertussis is present in your community, the best way to protect children under 7 years of age is to assure they are "up to date" on their immunizations. Children less than 7 years of age who are unimmunized, or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization, according to the following guidelines, as soon as possible after exposure:

a. Children who have received their third dose of DTP 6 months or more before exposure should receive a fourth dose at this time.

b. Children who have received 4 doses of DTP should get a booster dose of DTP, unless a dose has been given within the last 3 years.

If you have any questions, please call of
at .

Sincerely,

Attachment 11
Contact student
(Health Care Provider Letter)

Dear Health Care Provider:

Your patient has had significant contact with a case of pertussis and is being referred to you for erythromycin prophylaxis (50 mg/Kg/day divided in 4 doses/day, maximum dose of 2 gms/day). Trimethoprim-sulfmethoxazole is an acceptable alternative for those unable to tolerate erythromycin. (Pediatric dose: 8 mg Tmp/40 mg SMX/kg/day divided into 2 doses/day for 10-14 days. Adult doses: 160 mg Tmp/800 mg SMX given 2 times/day for 10-14 days.)

Asymptomatic students may return to school immediately after initiation of antibiotic prophylaxis.

The history obtained in the exposure setting suggests that your patient is asymptomatic. However, we advise you to re-evaluate your patient for symptoms of pertussis. We feel significant symptoms compatible with pertussis are a cough $\geq$ 14 days or paroxysmal cough, or cough with post-tussive vomiting. However, even milder symptoms should be regarded as suspicious.

1. If your patient is symptomatic, place symptomatic student and all household contacts on erythromycin for 10-14 days unless a specific medical contraindication exists. Trimethoprim-sulfamethoxazole is an acceptable alternative for those unable to tolerate erythromycin.

2. If you patient is symptomatic, obtain appropriate laboratory confirmation as indicated by duration of symptoms.

    a. For those with a cough of $\leq$ 14 days in duration, obtain a nasopharyngeal culture for *Bordetella pertussis*. Culture kits are available from the State Laboratory (617-522-3700, X243).

    b. When cough is 14 days in duration, cultures are often negative and serologic confirmation is most useful. For those with a cough > 14 days, obtain serum (0.5cc or more). If a specimen kit is not available, please send it in a red top tube (serum-separator type preferred) with the appropriate forms to Attention: Pertussis Serology Lab, State Laboratory Institute, 305 South Street, Jamaica Plain, MA 0230.

3. Advise symptomatic students to refrain from public activities until 5 days of antibiotic therapy have been completed. If student or household contacts are not symptomatic, they do not need to restrict their public activities.

4. **Due to the great potential for silent transmission in families**, we recommend all household contacts of diagnosed cases receive erythromycin or, if not tolerated, trimethoprim-sulfamethoxazole prophylaxis. All symptomatic contacts should be evaluated, placed on antibiotic therapy and excluded from activities as outlined above for cases. Any contacts who are not symptomatic still need to receive preventive antibiotic therapy, but do not need to restrict their public activities.

5. In addition to antibiotic prophylaxis, contact that are < 7 years of age, who are unimmunized, or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization , according to the following guidelines, as soon as possible after exposure:

    a. Children who have received their third dose of DTP ≥ 6 months before exposure should receive a fourth dose at this time.

    b. Children who have received 4 doses of DTP should get a booster dose of DTP, unless a dose has been given within the last 3 years.

If you have any questions, please do not hesitate to contact of at .

Sincerely,

Attachment 12
Information and Control
(Staff Letter)

Dear Staff:

A student here at has been identified as having pertussis (whooping cough). Other students have been identified as having a prolonged cough and therefore may also be cases of pertussis.

Pertussis is a highly communicable disease that is spread through the air when an infected individual coughs, sneezes or talks. The characteristic symptoms, a long series of coughs followed by a whooping noise, are more common in very young children. School-aged children and adults are more likely to have an upper respiratory illness that begins with cold symptoms and a cough, which becomes increasingly severe over 1-2 weeks and is often is confused with bronchitis and other respiratory diseases. There is generally no fever. Please refer to the enclosed "Public Health Fact Sheet" for more information about the symptoms, transmission and treatment of pertussis. Antibiotic therapy early in the course of the disease may decrease the severity of symptoms and reduce the infectiousness of the ill person. Antibiotics are also recommended for contacts of pertussis cases in order to prevent them from contracting and/or transmitting the disease.

Students in your classes with a cough for at least 14 days or any cough, of shorter duration, that is associated with paroxysms (spasms/inability to control coughing) or cough with vomiting should be referred to the school nurse for further medical evaluation. If you have experienced any of the above mentioned symptoms, you should also seek medical evaluation.

The following recommendations are being made to help prevent further spread of pertussis at our school:

1. All students with cough illness should be referred for medical evaluation.
2. All newly identified cases and symptomatic students and teachers will be excluded from school until they have completed 5 of the 10-14 days required for adequate antibiotic therapy.
3. All household contacts of diagnosed cases should receive antibiotics to prevent additional infections. In addition to antibiotic prophylaxis, contacts that are less than 7 years of age, who are unimmunized, or have received less that 5 doses of DTP should have immunization initiated or may need to continue immunization, according to the following guidelines, as soon as possible after exposure:

    1. Children who have received their third dose of DTP 6 months or more before exposure should receive a fourth dose at this time.

2. Children who have received 4 doses of DTP should get a booster dose of DTP, unless a dose has been given within the last three years.

4. Case contacts who are asymptomatic may return to work/school immediately after beginning erythromycin prophylaxis. In addition, there are certain high risk groups that should receive prophylaxis, even after minimal exposure, and regardless of symptoms. They are as follows:

   - People who have asthma or any other chronic respiratory illness
   - Pregnant women
   - Children who have had no pertussis immunization because of religious or medical exemptions
   - Children in elementary or middle school who have received less than four doses of pertussis vaccine
   - Children or staff who are immunocompromised because of underlying illness or immunosuppressive medications

ANYONE who has one of these risk factors should be advised to seek care and initiate preventive antibiotic therapy. Asymptomatic members of the high risk groups can return to school immediately after initiation of antibiotics. Members of the high risk groups who are symptomatic should be excluded until 5 days of antibiotics have been completed.

Please take the enclosed letter with you to your health care provider. If you wish further information, please call
of at .

Sincerely,

Dear Parent/Guardian:

There is an outbreak of pertussis at your child's school. Other students at the school have been identified with cough illness and may also be cases of pertussis.

Pertussis is a highly communicable disease that is spread through the air when infected people cough. The characteristic symptoms, a long series of coughs followed by a whooping noise, are more common in very young children. Older persons are more likely to have an upper respiratory illness that begins with cold symptoms and an irritating cough, which becomes increasingly severe over 1-2 weeks. There is generally no fever. Please refer to the enclosed "Public Health Fact Sheet" for information about the symptoms, transmission and treatment of pertussis. Antibiotic therapy early in the course of the disease may decrease the severity of symptoms and reduce the infectiousness of the ill person. **Antibiotics are also recommended for contacts of pertussis cases in order to prevent them from contracting and/or transmitting the disease.**

The following recommendations are being made to help prevent further spread of pertussis at our school:

1. If your child is symptomatic (cold, persistent cough, etc.), please have your child evaluated by your health care provider for pertussis.
2. All newly identified cases (including suspect cases) will be excluded from school until they have completed 5 of the 10-14 days required for adequate antibiotic therapy.
3. All household contacts of diagnosed cases should receive antibiotics to prevent additional infections. In addition to antibiotic prophylaxis, contacts who are less than 7 years of age, who are unimmunized or have received less than 5 doses of DTP, should have immunization initiated or may need to continue immunization, according to the following guidelines, as soon as possible after exposure:

    a. Children who have received their third dose of DTP six months or more before exposure should receive a fourth dose at this time.
    b. Children who have received four doses of DTP should get a booster dose of DTP, unless a dose has been given within the last three years.

4. Contacts who are asymptomatic (do not have any symptoms) may return to work/school immediately after beginning erythromycin prophylaxis.

Please take the enclosed letter with you to your health care provider. If you wish further information, please call
of at .

Sincerely,

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
IMMUNIZATION PROGRAM

GENERAL IMMUNIZATION RECOMMENDATIONS FOR CHILDREN AND ADULTS

A. THOSE EIGHTEEN YEARS OF AGE AND YOUNGER

1. The recommended schedules for the routine immunization of those eighteen years of age and less, as well as the requirements for day care, school and college attendance are outlined in attachment 1.

2. Children in certain high risk groups should receive influenza, pneumococcal and hepatitis B vaccines as outlined below in sections C1, C2 and C3.

B. THOSE OLDER THAN EIGHTEEN YEARS OF AGE
(Adult immunization schedule outlined in attachment 2)

1. Adults 18-64 years of age should have:

   a) A primary series of tetanus diphtheria (Td) toxoid if they have not received one in childhood. A primary series for adults is three doses of Td; the first two doses should be given at least four weeks apart and the third dose 6-12 months after the second.

   b) A Td booster every ten years.

   c) One dose of rubella vaccine.

   d) One dose of mumps vaccine[1].

   e) Two doses of measles vaccine [1].

   [1] Indicated for persons born after 1956.

2. In addition to the vaccines outlined in items 1a and 1b above, adults 65 years of age and older should have:

   a) One dose of pneumococcal vaccine [2].

   b) One dose of influenza vaccine given every year.

   [2] For those at highest risk for antibody decline or fatal pneumonia, (e.g., chronic renal failure, nephrotic syndrome, transplanted organs, asplenic patients), revaccination should be considered if it is six years or more since the first dose.

C. ADDITIONAL VACCINES RECOMMENDED FOR HIGH-RISK GROUPS

1. Adults and children two years of age and older in the following risk groups should receive one dose of pneumococcal vaccine [2]:

a) Immunocompetent individuals at increased risk due to chronic illnesses e.g., cardiovascular disease, pulmonary disease, diabetes mellitus, alcoholism, cirrhosis, cerebro- spinal fluid leaks, and those 65 years of age and older as outlined above.

b) Immunocompromised individuals at increased risk e.g., splenic dysfunction or anatomic asplenia[2], Hodgkin disease, lymphoma, multiple myeloma, chronic renal failure, nephrotic syndrome[2]. organ transplantation[2], drugs and other conditions associated with immunosuppression.

c) Asymptomatic or symptomatic HIV infection.

d) Persons living in special environments or social settings associated with increased risk/complications, e.g., Native American populations.

[2] For those at highest risk for antibody decline or fatal pneumonia (e.g., chronic renal failure, nephrotic syndrome, transplanted organs, asplenic patients) revaccination should be considered if it is six years or more since the first dose.

2. Adults and children six months of age and older in the following risk groups should receive one dose of influenza vaccine every year:

I. Those at risk for complications:

a) Residents of nursing homes and chronic care facilities housing patients of any age with chronic medical conditions.

b) Those with chronic cardiac and pulmonary disorders (including asthma).

c) Those who have required regular medical care due to: chronic metabolic diseases (including diabetes mellitus), chronic renal disease, hemoglobinopathies, drugs and disorders associated with immunosuppression (including symptomatic or asymptomatic HIV infection).

d) Those six months-eighteen years of age on long-term aspirin therapy, and therefore at risk for developing Reye Syndrome after influenza infection.

e) Those 65 years of age and older as outlined above.

II. Those Potentially Capable of Transmitting Influenza to High-Risk Persons:

a) Health care personnel in both acute and chronic care and in-patient and out-patient settings.

b) Providers of home care to high-risk persons.

c) Household contacts of high-risk persons.

3. In addition to all infants born after January 1, 1992, some adults and children in certain high-risk groups should receive three doses of hepatitis B vaccine. The first two doses are given one month apart, and the third dose is given five months after the second. (An alternative four dose schedule is approved for one manufacturer's vaccine.)

The hepatitis B vaccine series should be given to the following groups:

a) Infants born to mothers who are carriers.

b) Household and sexual contacts of carriers.

c) Sexually active homosexual and bisexual males.

d) Heterosexuals who have had more than one sexual partner in the last six months.

e) Heterosexuals who have recently been diagnosed with a sexually transmitted disease.

f) IV drug users.

g) Hemodialysis patients.

h) Recipients of certain blood products, e.g., clotting factors.

i) Inmates of correctional facilities.

j) Health care, laboratory and other public safety workers who have occupational exposure to blood and body fluids.

k) Clients and staff of institutions for the developmentally disabled.

l) Adoptees from countries where hepatitis B infection is endemic should be screened for hepatitis B surface antigen. If they test positive, members of the adopting family should be vaccinated.

m) International travellers who plan to spend more than six months in an endemic country.

Hepatitis B vaccine should also be considered for use in patients with a history of alcoholism or who have cirrhosis or HIV infection.

4. In addition to infants, Haemophilus influenzae type b (Hib) vaccine should be considered for use in adults with the following underlying conditions:

    a) splenectomy
    b) sickle cell disease
    c) Hodgkins disease and other hematologic neoplasms
    d) immunosuppression

5. Children two years of age and older in the following risk group should receive meningococcal vaccine:

    a) terminal compliment deficiency
    b) anatomic or functional asplenia

Consideration may be given to older individuals with the same risk factors.

NOTE:
A summary of immunizations recommended for certain high-risk patients can be found in attachment 3 and for HIV-infected individuals in attachment 4.

GUIDELINES OF THE IMMUNIZATION PROGRAM
MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
April 1993

As required by State Law, the Department of Public Health has established the following as legal **requirements for children to attend day care, kindergarten and school (grades 1-12).**

MINIMAL IMMUNIZATION REQUIREMENTS

	DAY CARE [1]	KINDERGARTEN	GRADES 1 - 6	GRADES 7-12
Hepatitis B [2]	3 doses			
DTP/DT/Td [3]	≥4 doses DTP	≥ 4 doses DTP	≥ 4 doses DTP or 3 doses Td	≥ 4 doses DTP or 3 doses Td
Polio [4]	3 or more doses	3 or more doses	3 or more doses	3 or more doses
Hib [5]	4 doses			
MMR [6]	1 dose	1 dose	1 dose	2 doses

These requirements provide day care centers and schools with the **minimally acceptable number of immunizations for attendance.** However, the **optimal recommendations** of the Massachusetts Department of Public Health (MDPH) are as follows:

Recommended Immunization Schedule
For children who have received all vaccines on time
(see next page for children behind schedule)

	Birth	1-2 mos	2 months	4 months	6 months	6-18 mos	15 months	4 to 6 years	14-16 years
Hep. B[2]	1st dose	2nd dose				3rd dose			
DTP[3]			1st dose	2nd dose	3rd dose		4th dose	5th dose	
Polio[4]			1st dose	2nd dose			3rd dose	4th dose	
Hib[5]			1st dose	2nd dose	3rd dose		4th dose		
MMR [6]							1st dose	2nd dose at 7th grade	
Td[3]									1st dose

Vaccine Administration Notes

1 **Day Care:** Minimal requirements by 24 months of age. Younger children should be age appropriately immunized according to the schedule above. MDPH recommends that children in other preschool programs be immunized according to the same schedule as that required in day care.

2 **Hepatitis B:** Recommended for all children born after January 1, 1992, and required for day care attendence for children in this age group. Schedule may vary depending on hepatitis B status of mother.

3 **DTP-DT-Td:** Fourth dose of DTP can be given at 18 months. Half doses are not acceptable. DT is only acceptable when accompanied by a letter stating there is a medical contraindication to DTP. First Td needed 10 years after last DTP and every 10 years thereafter.

4 **Polio:** Third dose of polio can be given at 18 months. Fourth dose should be administered by entry into kindergarten (4 to 6 years).

5 **Hib:** Number of doses required varies depending on age child starts immunization. Doses 3 and 4 should be given according to manufacturer's guidelines.

6 **MMR:** Although first dose is recommended at 15 months, requirement will be met if given on or after first birthday. Second dose is required at entry to 7th grade and must be given at least 30 days after the first dose.

(CHILDREN WHO ARE BEHIND SCHEDULE OR MISSED VACCINE, SEE NEXT PAGE)

Recommended schedule for children starting late (less than *seven* years old)

Age at start of vaccination ▼	Vaccine given at 1st visit	Timing and vaccines for later visits				
		1 month after first visit	2 months after first visit	4 months after first visit	6-12 months after **previous dose**	Preschool (4-6 years old)
2 to 6 months	DTP		DTP	DTP	DTP	DTP
	Polio		Polio		Polio	Polio
	Hib [2]		Hib [2]	Hib [2]	Hib booster at age ≥ 15 months [2]	
	Hep B[1]	Hep B[1]		Hep B[1]		
					MMR at age 15 mos [4]	
7 to 11 months	DTP		DTP	DTP	DTP	DTP
	Polio		Polio		Polio	Polio
	Hib [2]		Hib [2]	Hib booster at age ≥ 15 months [2]		
	Hep B[1]	Hep B[1]		Hep B[1]		
				MMR at age 15 mos [4]		
12 to 14 months	DTP		DTP	DTP	DTP	DTP
	Polio		Polio		Polio	Polio
	Hib [2]		Hib [2]			
	Hep B[1]	Hep B[1]		Hep B[1]		
		MMR at age 15 mos [4]				
15 to 59 months	DTP		DTP	DTP	DTP	DTP [3]
	Polio		Polio		Polio	Polio [3]
	Hib [2]					
	Hep B[1]	Hep B[1]		Hep B[1]		
	MMR [4]					
5 to 6 years	DTP		DTP	DTP	DTP	
	Polio		Polio		Polio	
	MMR	Second dose of MMR due at entry to 7th grade [4]				
	(Hib vaccine is not routinely recommended for children 5 years (60 months) or older)					

Recommended schedule for children starting late (aged *seven* or older)

VACCINE	First visit	2 months after 1st visit	8-14 months after 1st visit	At entry to 7th grade	High school & every 10 years thereafter
Td	First dose	Second dose	third dose		additional doses
Polio [5]	First dose	Second dose	third dose		
MMR [4]	First dose			Second dose	

Vaccine Administration Notes:

1. Hepatitis B vaccine recommended for children born on or after January 1, 1992.
2. Hib schedule varies depending on when child starts vaccination.
3. Fifth dose of DTP and fourth dose of polio are not needed if previous doses were given after fourth birthday.
4. Second dose of MMR must be given at least 30 days after first dose and is required for entry to 7th grade.
5. Polio not recommended for those 18 years and older unless there is a potential for exposure.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
IMMUNIZATION PROGRAM
MOST COMMON VACCINES AND TOXOIDS RECOMMENDED FOR ADULTS [1]

	VACCINE/TOXOID					
Age Group	Td [2]	Measles	Mumps	Rubella	Influenza	Pneumococcal
18-64	X	X[3]	X[4]	X		
≥65	X				X[5]	X[6]

[1] Additional vaccines are recommended for adults in various occupational, medical and other risk groups.

[2] Td = Tetanus and diphtheria toxoids, adsorbed (for adult use), which is a combined preparation containing < 2 flocculation units of diphtheria toxoid. A primary series consist of 3 doses, a booster dose is recommended every 10 years.

[3] Two doses recommended for persons born after 1956.

[4] One dose recommended for persons born after 1956.

[5] One dose annually is recommended for those ≥ 65 years of age and for younger adults in certain high risk groups e.g., chronic cardiovascular or pulmonary disease (including asthma), chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies drugs or medical disorders associated with immune suppression (including symptomatic and asymptomatic HIV infection), those 6 months-18 years receiving long term aspirin therapy and therefore are at risk for developing Reye Syndrome, and those capable of transmission to high risk groups, health care personnel, home care providers, household members of high risk patients.

[6] One dose is recommended for those ≥ 65 years of age and for younger adults in certain high risk groups e.g., chronic cardiovascular or pulmonary disease, diabetes mellitus, alcoholism, cirrhosis, cerebrospinal fluid leaks, splenic dysfunction, anatomic asplenia, Hodgkin disease, lymphoma, multiple myeloma, chronic renal failure, nephrotic syndrome, organ transplantation, drugs or medical disorders associated with immunosuppression (including symptomatic or asymptomatic HIV infection, certain Native American populations).

For those at highest risk for antibody decline or fatal pneumonia, revaccination should be considered if it is 6 years or more since the first dose e.g., chronic renal failure, nephrotic syndrome, transplanted organs, asplenic patients.

IMMUNIZATIONS RECOMMENDED FOR HIGH RISK PATIENTS

Vaccines and toxoids[1] indicated or specifically contraindicated for situations involving special health status, United States

	VACCINE-TOXOID	
HEALTH SITUATION	INDICATED	CONTRAINDICATED
Pregnancy[2]	Tetanus-Diphtheria	Live virus vaccines[3]
Immunocompromised[4]	Influenza Pneumococcal polysaccharide *Haemophilus influenzae* type b[5]	Live-virus vaccines Bacille Calmette-Guerin Oral typhoid
Splenic dysfunction or anatomic asplenia	Pneumococcal polysaccharide Influenza Meningococcal polysaccharide *Haemophilus influenza* type b[5]	
Hemodialysis or transplant recipients	Hepatitis B[6] Influenza Pneumococcal polysaccharide	
Deficiencies of factors VIII or IX	Hepatitis B	
Chronic alcoholism	Pneumococcal polysaccharide	
Diabetes and other high-risk diseases	Influenza Pneumococcal polysaccharide	

1 Unless specifically contraindicated, the routine vaccines and toxoids recommended, by age group, are also indicated.

2 Consideration should be given to administering other vaccine, e.g., influenza, hepatitis B, to pregnant women who have certain medical conditions or risk factors.

3 OPV and yellow fever vaccine may be given because of imminent exposure (not just for travel requirements).

4 Recommendations specific to people with human immunodeficiency virus are listed in attached Table 2.

5 According to AAP, should be given to children. May be considered for adults.

6 These patients will need a higher dose or an increased number of doses.

NOTES

✓ Live viral vaccines may be administered no less than three months after immunosuppressive therapy has been discontinued or immunoglobulins received.

✓ Short-term (two weeks) corticosteroid therapy, topical steroid therapy (e.g., nasal or skin), and intra-articular, bursal, or tendon-joint injections with steroids should not be immunosuppressive and are not contraindications to live viral vaccines.

✓ Inactivated vaccines are not a risk to immunocompromised persons. However, immune response may be inadequate. If possible, delay administration of inactivated vaccines for three to four weeks after chemotherapy and when peripheral granulocyte counts are $>1000/mm^3$.

(Adapted from: ACIP Update on Adult Immunizations MMWR 1991; 40/RR-12)

IMMUNIZATION RECOMMENDATIONS FOR HIV-INFECTED PEOPLE[1]

Vaccine Toxoid[2]	HIV infection	
	Known asymptomatic	Symptomatic
DTP/Td	yes	yes
OPV	no	no
eIPV[3]	yes	yes
MMR	yes	yes[4]
HbCV[5]	yes	yes
Pneumococcal	yes	yes
Influenza	yes[4]	yes

1 Appropriate for human immunodeficiency virus (HIV)-infected children and adults.

2 The vaccine-toxoid abbreviations are defined as follows: DTP = Diphtheria and tetanus toxoids and pertussis vaccine, adsorbed (pediatric); Td - Tetanus and diphtheria toxoids, adsorbed (for adult use); OPV = Oral polio virus vaccine; EIPV = Enhanced-potency inactivated polio virus vaccine; MMR = Measles, mumps, and rubella vaccine; HbCV = *Haemophilus influenzae* type b conjugate vaccine; and Pneumococcal = Pneumococcal polysaccharide vaccine.

3 For adults ≥18 years of age, use only if indicated.

4 According to AAP, should be given to children. Should be considered for adults.

5 According to AAP, should be given to children. May be considered for adults.

(Adapted from: ACIP Update on Adult Immunizations MMWR 1991; 40/RR-12)